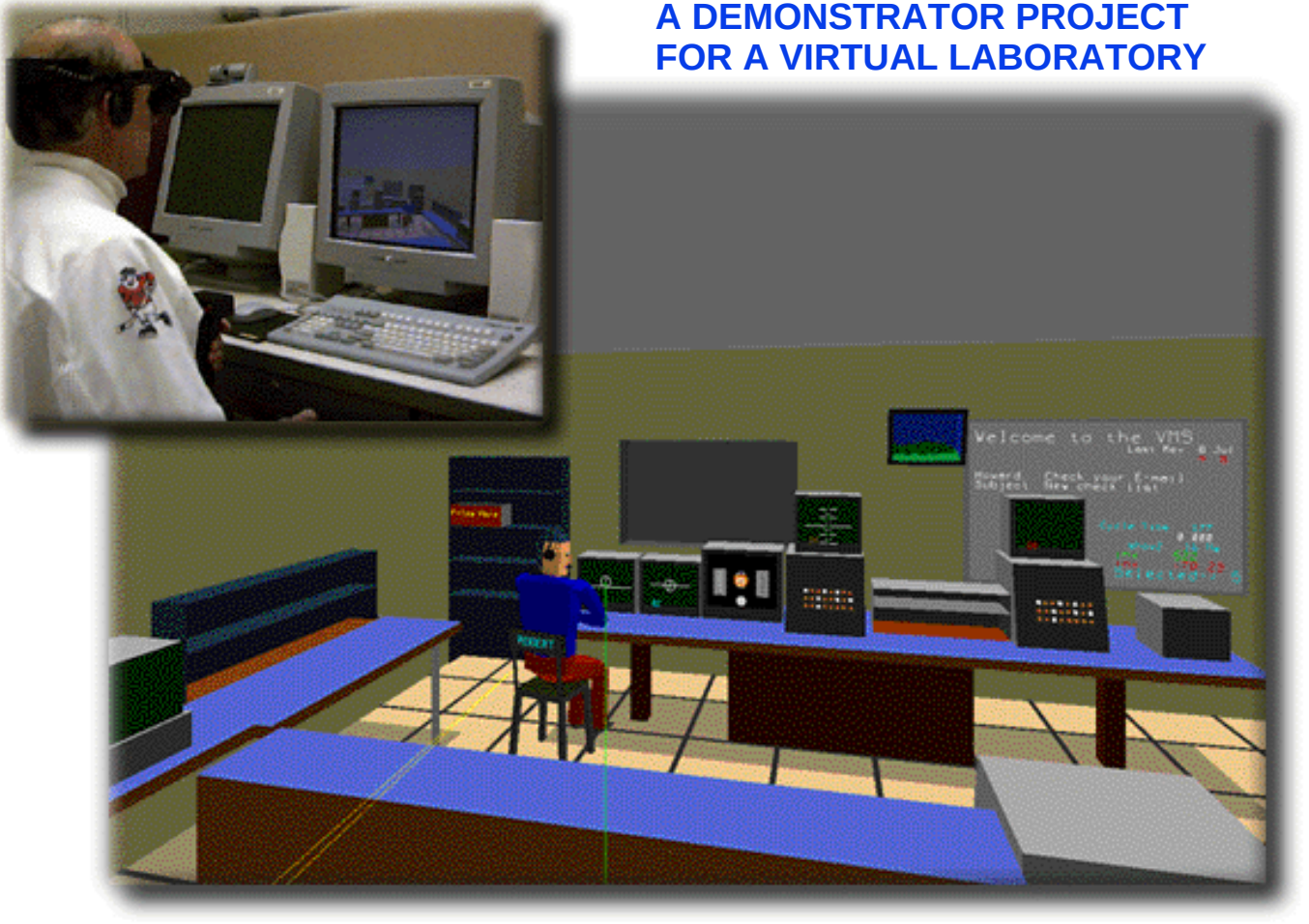
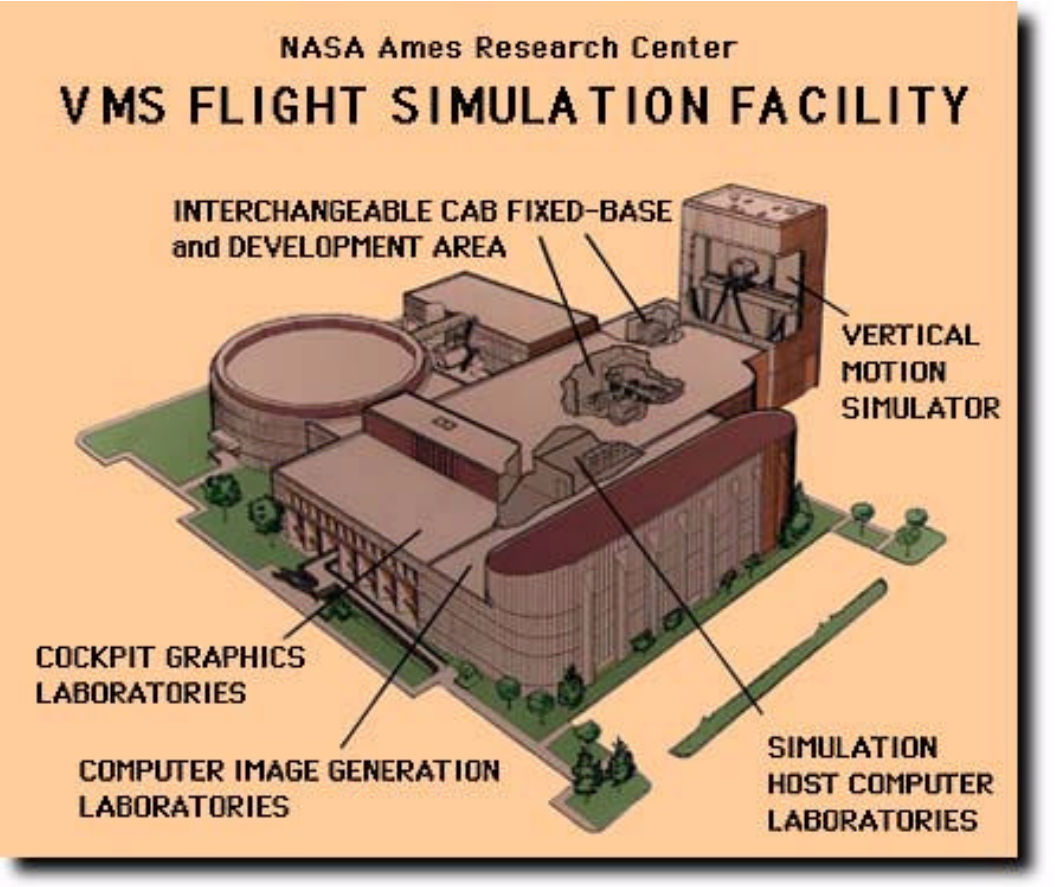
VIRTUAL SIMULATION LABORATORY

A DEMONSTRATOR PROJECT FOR A VIRTUAL LABORATORY

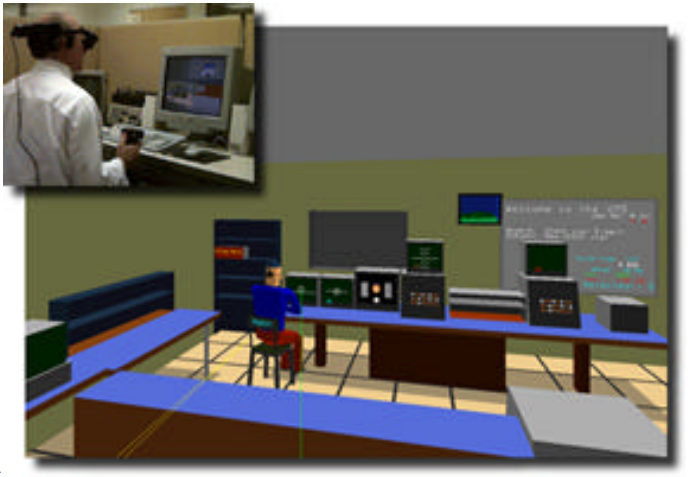



NASA Ames Research Center
VMS FLIGHT SIMULATION FACILITY
INTERCHANGEABLE CAB FIXED-BASE
and DEVELOPMENT AREA
VERTICAL
MOTION
SIMULATOR
COCKPIT GRAPHICS
LABORATORIES
COMPUTER IMAGE GENERATION
LABORATORIES
SIMULATION
HOST COMPUTER
LABORATORIES

VIRTUAL SIMULATION LABORATORY

A DEMONSTRATOR PROJECT FOR A VIRTUAL LABORATORY

A virtual environment providing remote, interactive participation with ARC simulation laboratories



Leverage the information technologies inherent to real-time simulation to create an immersive, highly interactive, virtual environment tailored to the needs of the aeronautical design process

Expedites delivery of aeronautical knowledge obtained from simulation experiments to US aircraft industry

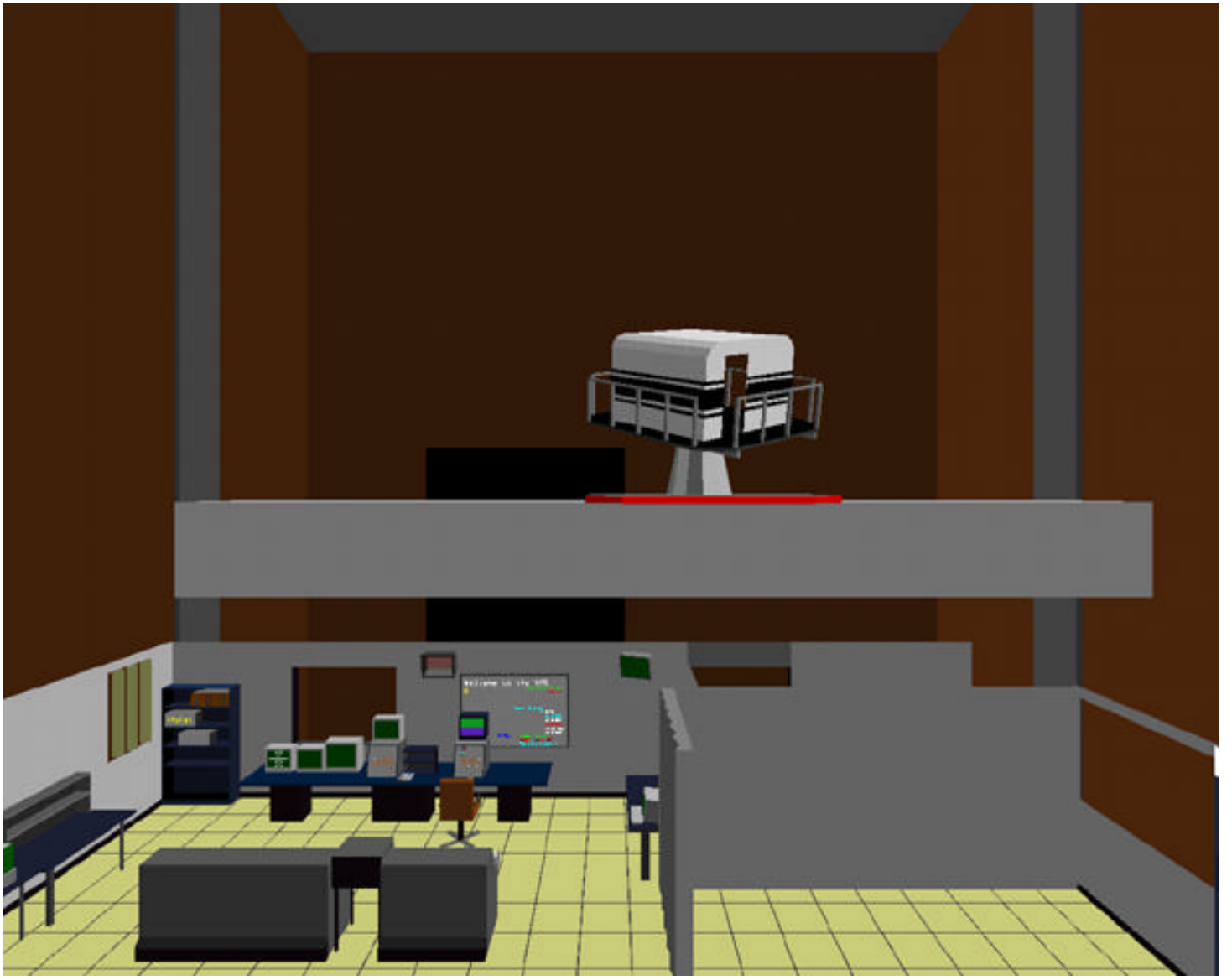
This project will deliver a fully functional prototype, situated at JSC, participating in a Space Shuttle simulation on the VMS in FY97.

POC: Tom Alderete ext. 4-3271

CENTRAL ROLE OF SIMULATION IN AIRCRAFT DESIGN CYCLE

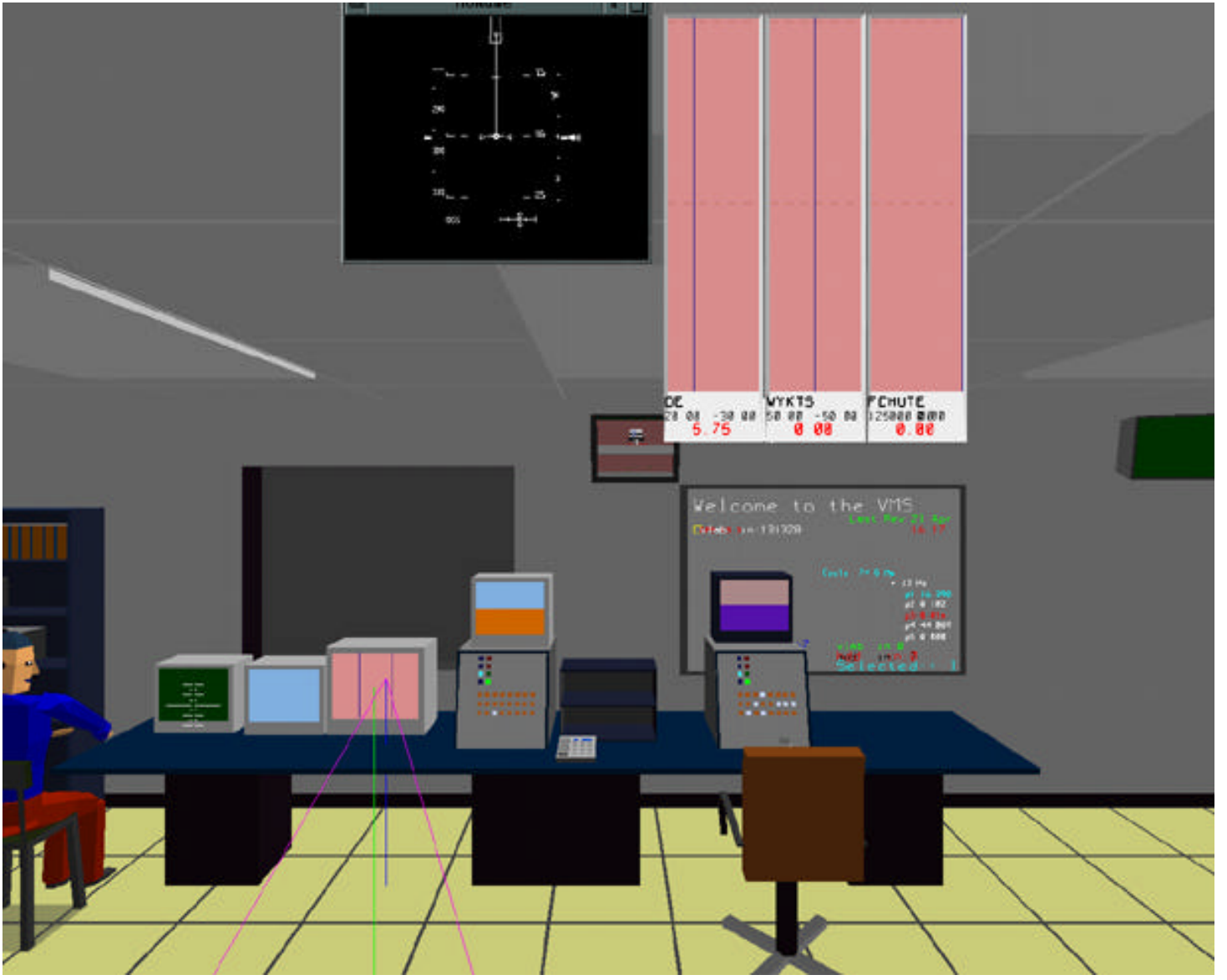
- Delivers NASA's simulation capability to industry's doorstep
  - ARC simulators are high fidelity, research oriented facilities
  - ARC simulators can be used for specific, focused purposes as well as basic research topics
- Allows industry to iterate design steps with piloted simulation
  - faster, less expensive pilot-in-the-loop evaluation of designs
  - closes loop with CFD and WT testing for better design decisions earlier in the process
  - interoperability among AOS facilities such as ATC, SDTF, full mission, and part task
  - collaborative work with Neural Net simulations (Code I)
- Enables industry/government partnerships to the benefit of US aeronautics
  - easier access to National facilities
  - shared databases
  - more effective and efficient design process

Graphic of Virtual VMS Control Room



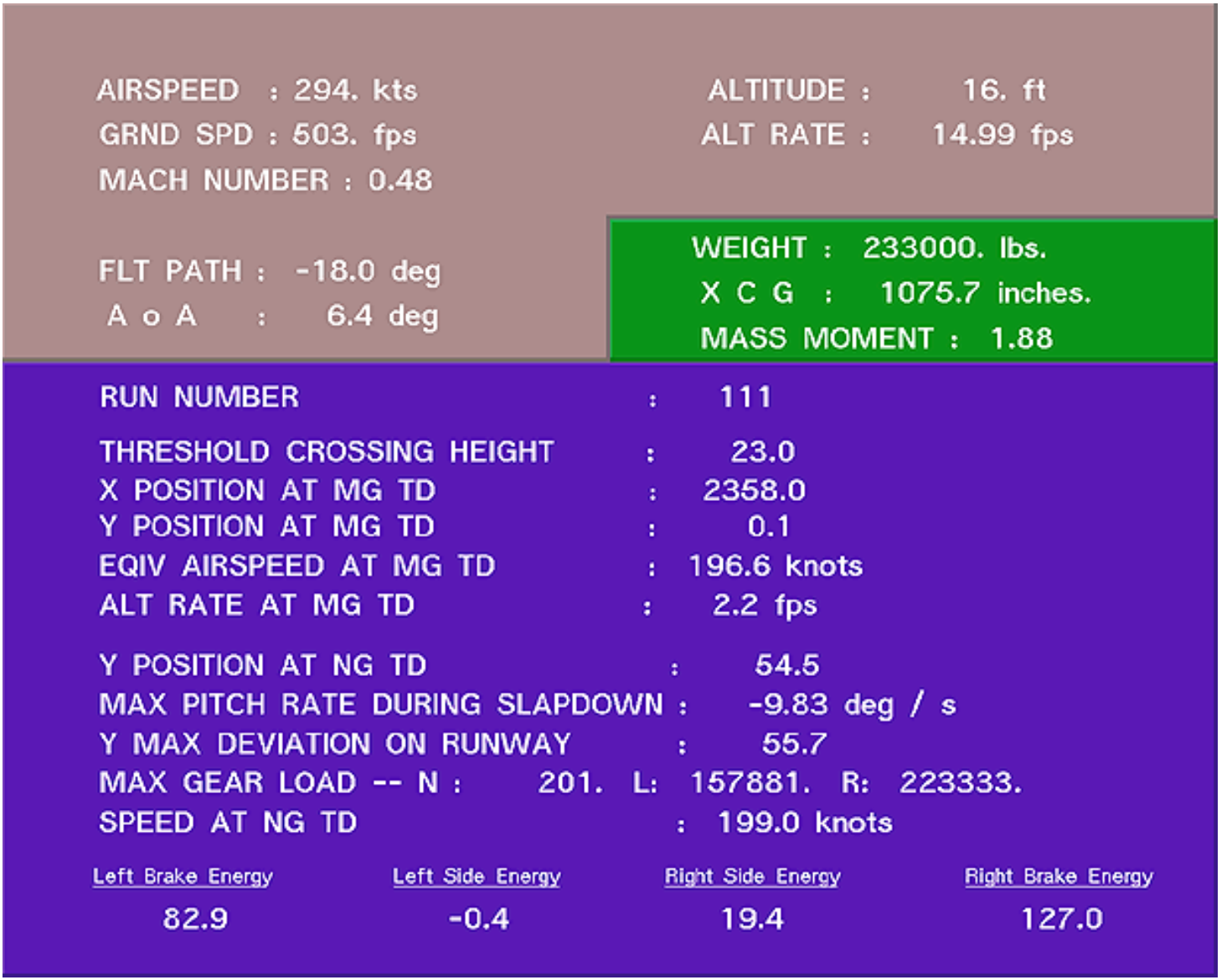
Graphic of Control Room and Motion System

3-D Virtual Environment with 2-D HUD Overlay

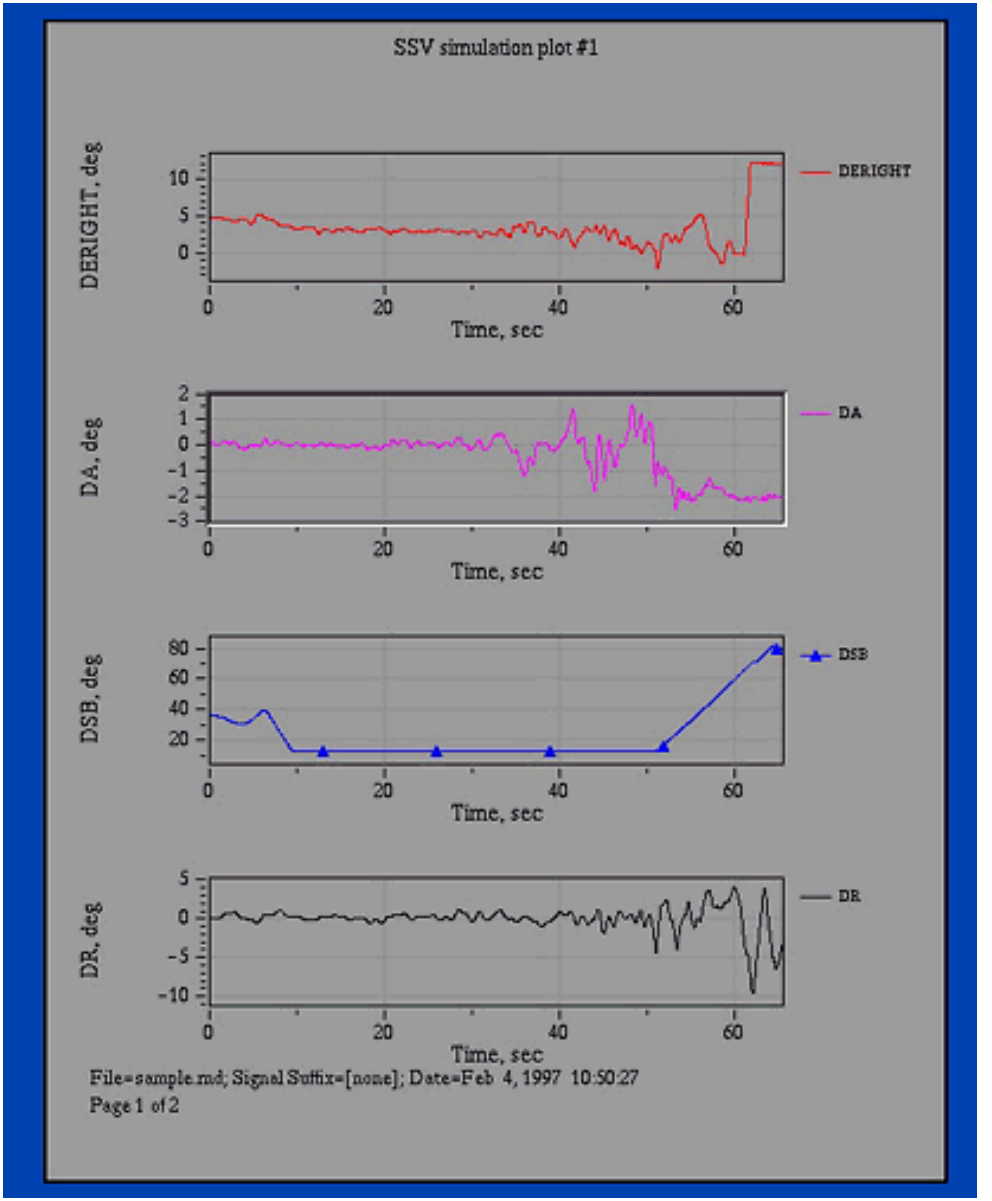


Strip Charts Added to Display

Several 2-D Overlays Added to Virtual Lab

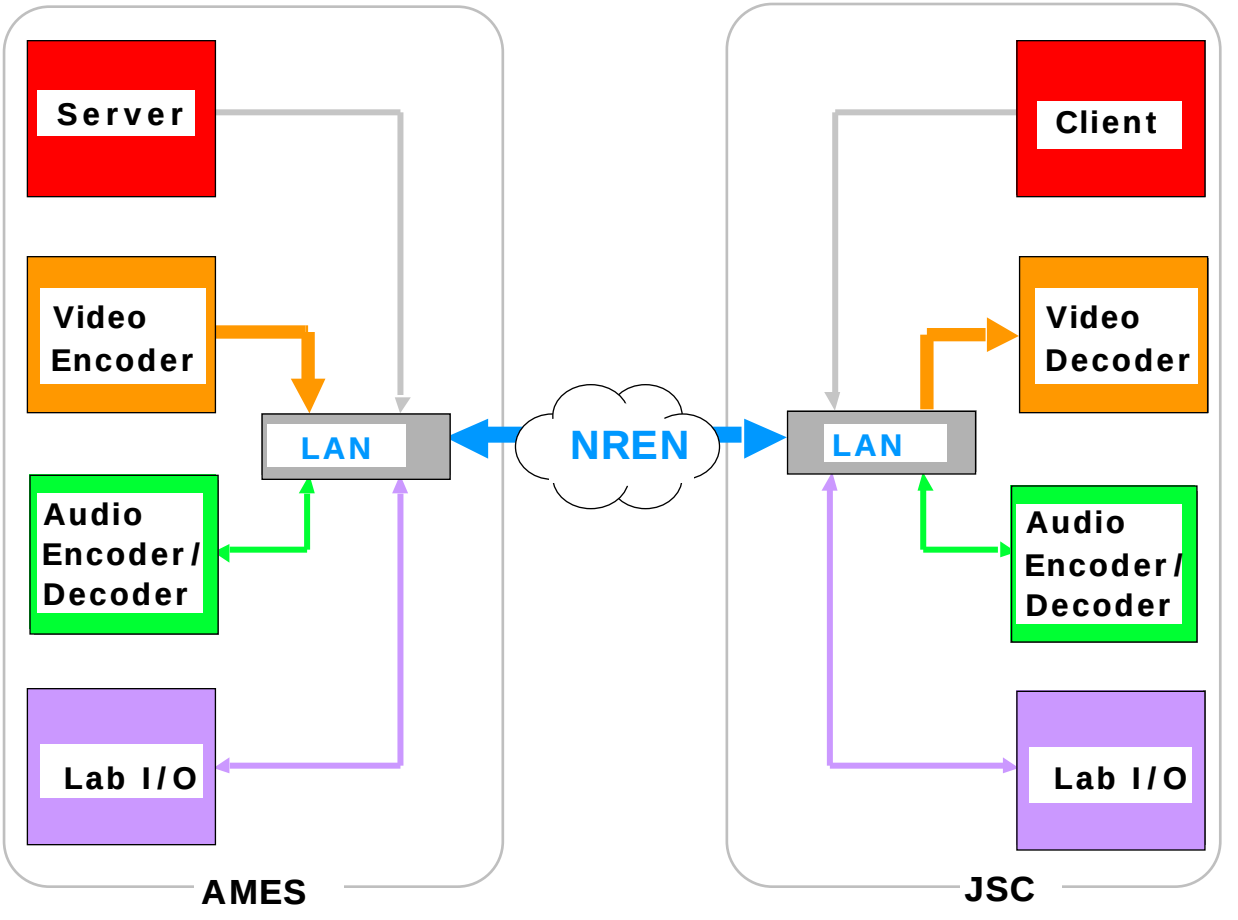


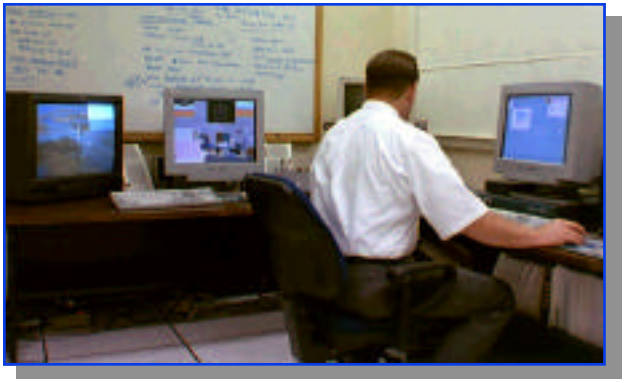
End of Run Display



X-Y Plotting Using Quickplot

VLAB Systems Block Diagram





VLAB Configuration at the Johnson Space Center (JSC)

‘Teleresearcher’ at JSC

Research Test Plans

- Baseline Performance
- Regular Performance Testing
- Latency vs. Realtime at VMS
- Evaluate Alternate Communications Methods
- Compare Different Operational Modes/ Procedures
- Evaluate Research Effectiveness with Different Configurations

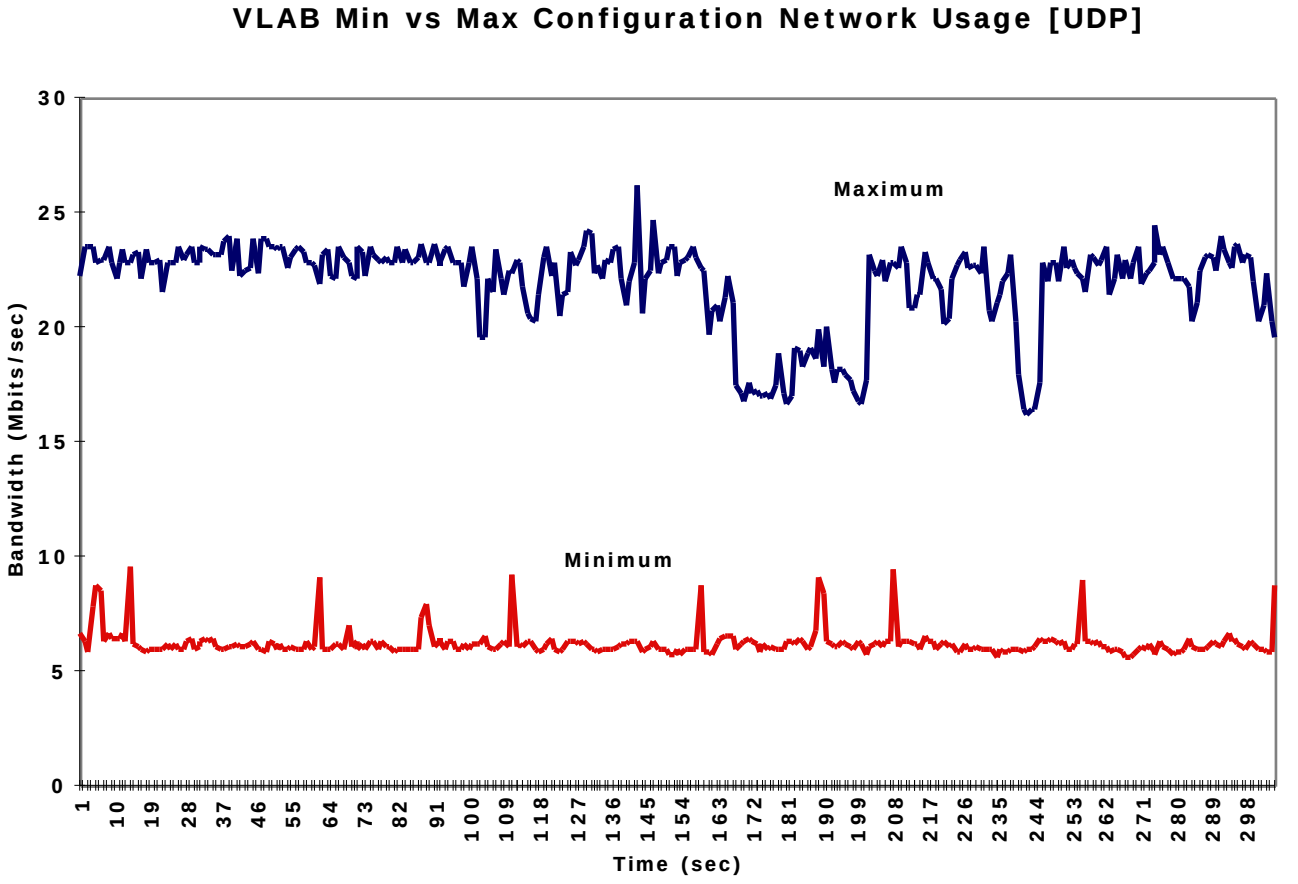
Users Surveyed

- Rated VLAB as very useful and would use it again
- Rated the virtual interface as very good
- Liked the ability to customize the tools suite and views within the graphical user interface
- Obtained “Needed Data” using VLAB
- Rated performance and reliability as very good
- Rated support as excellent

Network Usage and Performance

- Maximum Net Usage Configuration per Functional Component
  - Client @ < 1 Mbit/s
  - Audio System @ < 1 Mbit/sec
  - Video Conference @ 6 Mbit/sec
  - Observation Video @ 15 Mbit/sec
- Minimized Net Usage Configuration per Functional Component
  - Client @ < 1 Mbit/s
  - Audio System @ < 1 Mbit/sec
  - Video Conference @ 2 Mbit/sec
  - Observation Video @ 4.3 Mbit/sec
- Network performance was reliable and consistent with two exceptions:
  - Time lost troubleshooting ATM switch problem at JSC site
  - Spurious disruption of audio/video UDP streams on two occasions
  - No essential data lost at either event.

Network Usage and Performance



Summary

- **Tool Deemed Very Useful**
  - Remote & Local Investigators Collaborated with Colleagues at JSC to Solve Numerous Problems.
  - Investigator Ran Experiment an Extra Week from the Remote Site.
  - Other Programs are Inquiring About VLAB for their Application.

WHY DO IT?

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URL

- http://www.simlabs.arc.nasa.gov/vlab